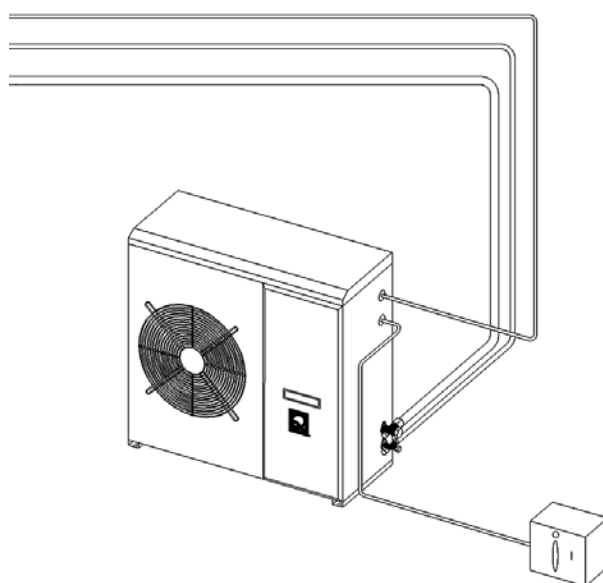


QUALITAIR

APPLICATION MANUAL ICU CONDENSING UNIT



ICU CONDENSING UNIT

**IF SUPPLIED AS A SYSTEM (ICC,QKK,QLC) PLEASE REFER TO INDOOR UNIT
INSTALLATION MANUAL**

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1. Installation and Safety

1.1 Installation

The units making up the Air Conditioning System must only be installed by a qualified engineer, following the mandatory and local codes of practice.

1.2 Handling

Care must be taken when the units are moved or lifted to ensure that everyone and everything is safe. When lifting equipment is used it must be suitable and approved.

1.3 Application

Ensure that the unit is only used for suitable purpose/applications.

1.4 Electrical connection

Electrical work and connections must only be made by authorised electricians in accordance with mandatory regulations and local codes of practice.

1.5 Warranty

Failure to comply with the manufacturers installation instructions could affect the performance of the unit and invalidate the warranty. Warranty is also subject to the implementation of a planned service/maintenance agreement as documented in the warranty booklet supplied with the unit.

SAFETY PROCEDURES

1.6 General

- a. All works must be carried out in accordance with the manufacturers installation and operating procedures.
- b. Good working practices must be followed at all times so that Mechanical and Electrical hazards are kept to a minimum.
- c. The equipment has been fitted with doors and covers to prevent access during operation. These must be kept in place and additional guards fitted if necessary.
- d. The equipment must be connected to an external electrical isolator if one is not supplied fitted to the unit.
- e. Servicing and maintenance must only be carried out by fully qualified and competent staff. Before any work is started, electrically isolate the units to make sure that they can not be switched on accidentally and allow sufficient time for isolated parts to come to rest before removing panels. Electrical isolation switches must be labelled to show that they are OFF during servicing and maintenance operations.

Note: Some units are dormant in standby mode and can restart without warning if they are not electrically isolated.

- f. Care must be taken not to touch components or pipework which may be extremely hot, or cold for a period after the unit is electrically isolated.
- g. After completing any tasks ensure all guards, covers and doors are correctly refitted before restoring the power supply to the unit.
- h. Air conditioning equipment may generate unacceptable noise levels. If noise levels are unacceptable sound and vibration attenuators may be required. For noise levels guidance refer to technical literature, or contact Qualitair, or their distributors for advice.

SPECIAL NOTES

IF ANYTHING IS NOT CLEAR PLEASE CONTACT YOUR DISTRIBUTOR FOR CLARIFICATION

2. Introduction to Units

SYSTEM DESCRIPTION

2.1 ICU Outdoor Unit

The unit is a floor mounting condensing unit, which can also be wall mounted using the QRO Wall Bracket Option Kit (except the QRO60). The unit is supplied complete with axial fan and guard, hermetic compressor, shut off service valves, fan speed controller, low pressure switch and an electrical section. On QRO9,12,18 and 24 units the fan speed controller is Temperature sensing and on QRO36,48 & 60 units it is Pressure sensing.

2.2 Option Kits

The ICU units can be supplied with a range of option kits which will require fitting at site. Instructions for fitting are supplied with the Option Kits.

FIGURE 2.1

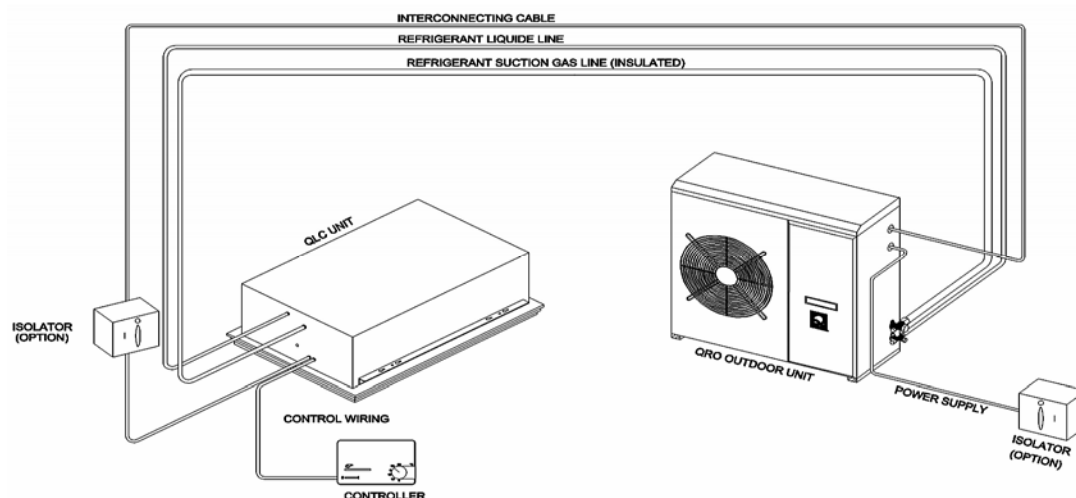


Table 2.2 ICU Packing sizes and weights

	ICU25	ICU35	ICU55	ICU70	ICU100	ICU150	ICU180
Width mm	83	83	91	91	116	116	146
Height mm	69	69	84	84	84	84	84
Depth mm	28	28	35	35	35	35	35
Weight kg	42	42	63	64	91	93	100

Table 2.3 ICU Sizes and weights

	ICU25	ICU35	ICU55	ICU70	ICU100	ICU150	ICU180
Width mm	720	720	800	800	1050	1050	1350
Height mm	610	610	765	765	765	765	765
Depth mm	250	250	320	320	320	320	320
Weight kg	40	40	60	61	88	90	97

2.3 Part Numbers

Table 2.4 A/C Units

	R22	R407C
ICU09	J97233-02	J97643-02
ICU012	J97243-02	J97643-02
ICU018	J97263-02	J97663-02
ICU024	J97283-02	J97683-02
ICU024(3)	J97284-02	J97684-02
ICU036	N/A	J97623-02
ICU036(3)	J97224-02	J97624-02
ICU048(3)	N/A	J97614-02
ICU6093	N/A	J97694-02

Table 2.5 H/P Units

	R22	R407C
ICU09	J97235-02	N/A
ICU012	J97245-02	J97645-02
ICU018	J97265-02	J97665-02
ICU024	J97285-02	J97685-02
ICU024(3)	J97286-02	J97686-02
ICU036	N/A	J97625-02
ICU036(3)	J97226-02	J97626-02
ICU048(3)	N/A	J97616-02
ICU6093	N/A	J97696-02

Table 2.6 Options

[illegible]

3. Location and Mounting of Outdoor Unit (ICU)

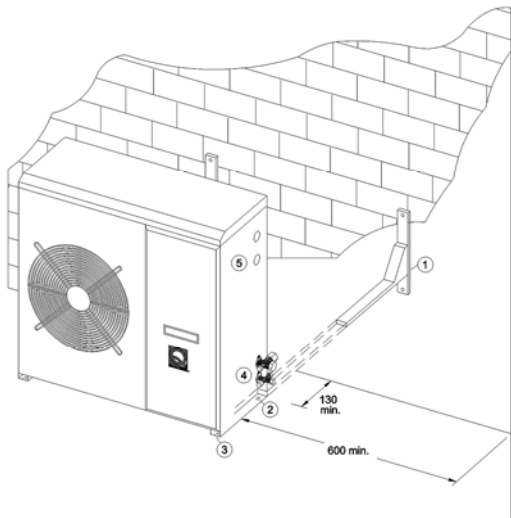


Figure 3.1 – ICU Wall Bracket Fixing

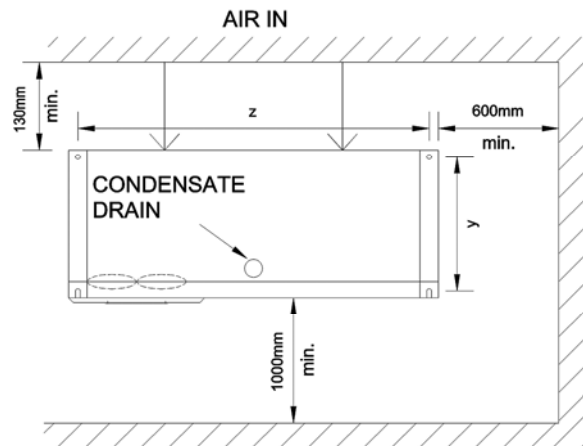


Figure 3.3 – ICU Wall Unit Positioning

Table 3.1 – QRO Wall Mount Kit Fixing

	ICU25	ICU35	ICU55	ICU70	ICU100 ICU150
Dim 'y' mm	220	220	290	290	290
Dim 'Z'	670	670	750	750	1000

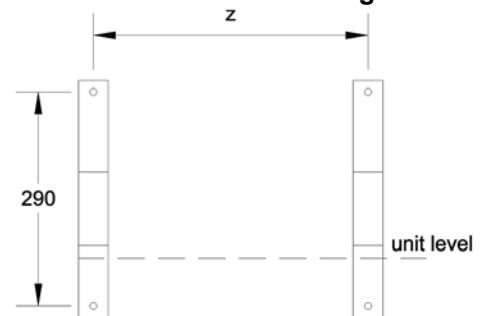


Figure 3.2 – ICU Unit Fixing

3.1 Location

The unit can either be mounted on a level surface or suspended from a vertical wall using the Qualitair wall mounting Optional kit (1) (not available on ICU180 units). The unit should always be mounted on a load bearing wall and not a partition wall. Ensure there is sufficient free area around the unit as detailed in Figure 3.3.

3.2 Fixing

Two off hole fixings (2) and two off slot fixings (3) suitable for M10 fixings are provided in the base of the unit to secure the unit to a suitable plinth, or to the wall mount bracket kit. If required the contractor should install the unit on anti - vibration pads.

3.3 Service Connections

The refrigerant pipe (4) and electrical (5) connections are located at the right hand end of the unit, and the condensate drain for the heat pump unit is located on the base of the unit. A loose drain connector is supplied for connection on heat pump units where required.

3.4 Air Entry

Ensure there is adequate air entry at the back of the unit as detailed in Figure 3.3 above.

SPECIAL NOTES : ENSURE CONDENSER HAS ADEQUATE CLEARANCE AROUND IT AND IS NOT AFFECTED BY NEIGHBOURING CONDENSING UNITS

4. Outdoor Unit Access (ICU)

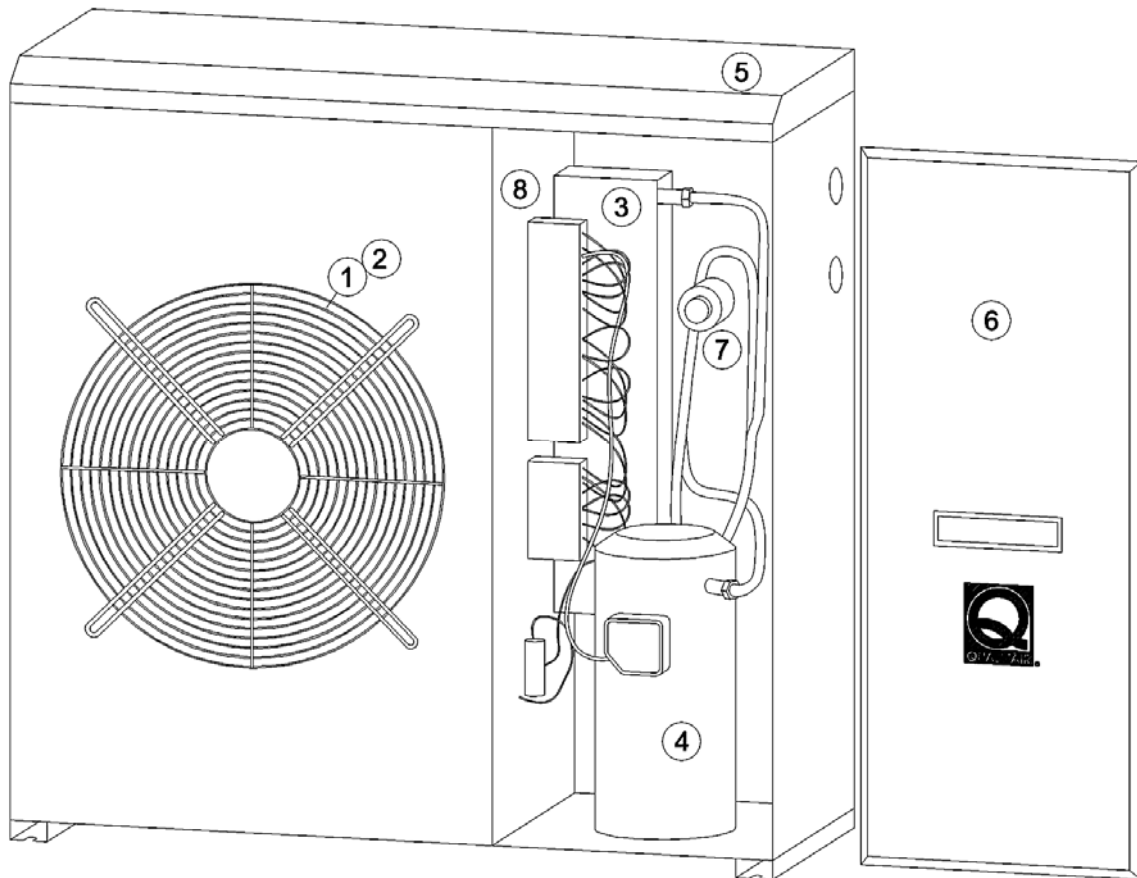


Figure 4.1 – Unit Internal Access

4.1 Access Details/Fixings

Item No.	Unit Component	Access Details/Fixings
(1)	Fan guard	Front access set screw fixings
(2)	Fan/motor ((fixed to rear of fan guard)	Front access set screw fixings on guard
(3)	Condenser coil	Access from rear of unit
(4)	Compressor	Remove "service access panel"
(5)	Removable top panel	Front and side access screw fixings
(6)	Service access panel	Front access screw fixings
(7)	Reversing valve (Heat pump unit only)	Remove "service access panel"
(8)	Electrics/customers connection	Remove "service access panel"
(9)	Low pressure cutout	Remove " service access panel"
(10)	High pressure cutout	Remove "service access panel"
(11)	Unit wiring diagram	Remove "service access panel"

SPECIAL NOTES :

CHECK THAT THE INDOOR UNIT IS CORRECTLY MATCHED TO THE OUTDOOR UNIT. ALL PIPEWORK, INSULATION AND ELECTRICAL CABLING IS TO BE SUPPLIED BY OTHERS.

5. General Service Connections

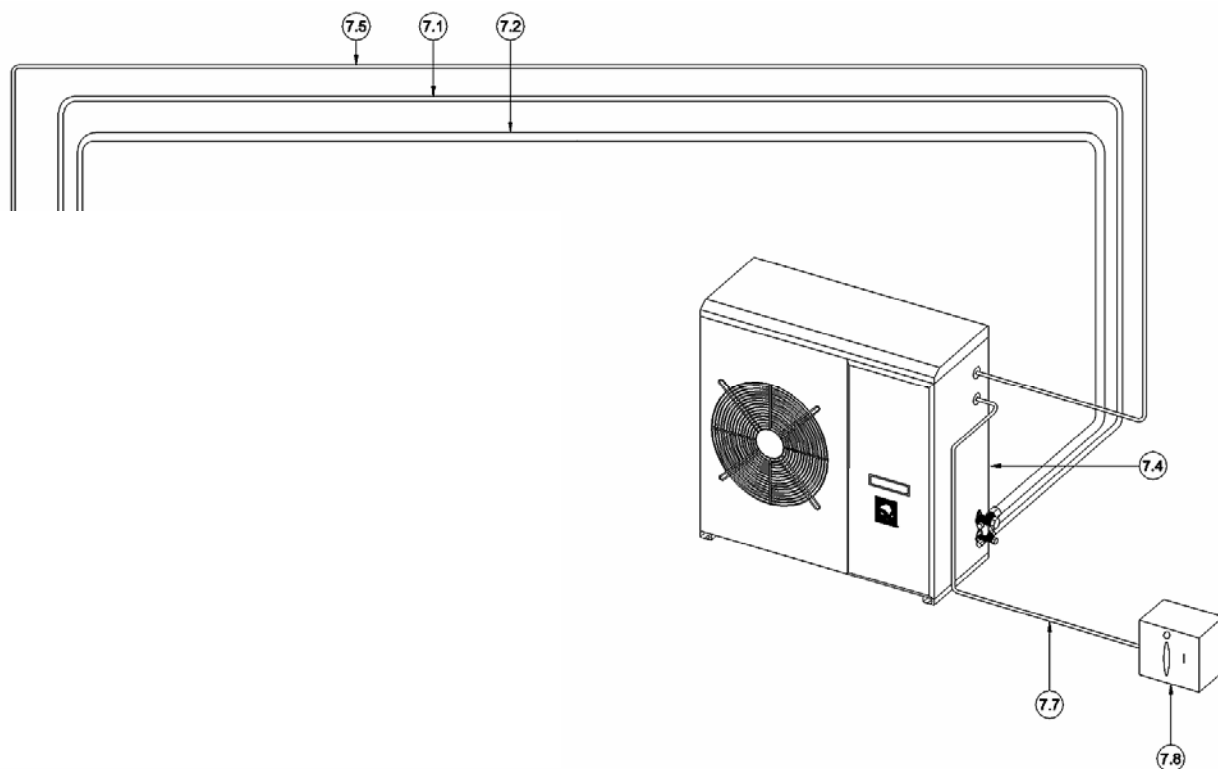


Figure 5.1 – Unit Connections and Interconnections

SPECIAL NOTES :

CHECK LOCAL REGULATIONS FOR INDOOR/OUTDOOR ELECTRICAL ISOLATION REQUIREMENTS AND REFRIGERATION PIPEWORK STANDARDS

5. General Service Connections

Table 7.1 – Refrigerant Line Sizes

	ICU25	ICU35	ICU45/55	ICU70	ICU100	ICU135	ICU170
Liquid	1/4 "	1/4 "	1/4 "	3/8"	3/8"	3/8"	1/2"
Suction	5/8"	5/8"	5/8"	3/4"	3/4"	7/8"	7/8"

Table 7.2 – ICURefrigerant Connections

	ICU25	ICU35	ICU45/55	ICU70	ICU100	ICU135	ICU170
Liquid connections	1/4 "	1/4 "	1/4 "	3/8"	3/8"	3/8"	1/2"
Suction connections	5/8"	5/8"	5/8"	3/4"	3/4"	7/8"	7/8"

Table 7.3 – Interconnecting Cable -No. of Cores

	ICU25	ICU35	ICU45/55	ICU70	ICU100	ICU135	ICU170
A/C Unit	4	4	4	4	4	4	4
A/C Unit + Heaters	4	4	6	6	6	6	6
Heat Pump Unit	6	6	6	6	6	6	6

Table 7.4 – Mains Power Cable – No of Cores

	ICU25	ICU35	ICU45/55	ICU70	ICU100	ICU135	ICU170
Single Phase System	3	3	3	3	3	N/A	N/A
Three Phase System	N/A	N/A	N/A	5	5	5	5

Table 7.5 – ICU I Phase Fuse Rating

	ICU25	ICU35	ICU45/55	ICU70	ICU100
Run Current(A)	2	6.6	10.6	16.1	25
Locked Rotor Current (A)	28	28	53	82	114
HRC Fuse Rating (A)	10	10	16	20	32

Table 7.6 - ICU 3 Phase Fuse Ratings – (AMPS/Phase)

	ICU70	ICU100	ICU135	Icu170
Run Current (A)	6	7.5	11	15.5
Locked Rotor Current (A)	33	49	62	95.8
HRC Fuse Rating (A)	10	16	20	32

6. Power and Control Connections

ICU SINGLE PHASE COOLING ONLY

ICU Terminal	Customer Connections
PE	Customer Earth Connection
E	Unit earth connection
N	Customer Neutral Connection
L	Customer Live Connection
C	Cooling Signal (From Indoor Unit)
S	Sensor (fan speed controller)

ICU SINGLE PHASE HEAT PUMP

ICU Terminal	Customer Connections
PE	Customer Earth Connection
E	Unit earth connection
N	Customer Neutral Connection
L	Customer Live Connection
C	Cooling Signal (From Indoor Unit)
S	Sensor (fan speed controller)
RV	Reversing valve signal
H	Heating Signal (From Indoor Unit)

ICU THREE PHASE COOLING ONLY

ICU Terminal	Customer Connections
PE	Customer Earth Connection
E	Unit earth connection
N	Customer Neutral Connection
L1	Customer Live Connection
L2	Customer Live Connection
L3	Customer Live Connection
C	Cooling Signal (From Indoor Unit)
S	Sensor (fan speed controller)

ICU THREE PHASE HEAT PUMP

ICU Terminal	Customer Connections
PE	Customer Earth Connection
E	Unit earth connection
N	Customer Neutral Connection
L1	Customer Live Connection
L2	Customer Live Connection
L3	Customer Live Connection
C	Cooling Signal (From Indoor Unit)
S	Sensor (fan speed controller)
RV	Reversing valve signal
H	Heating Signal (From Indoor Unit)

Table 6.1 – Electrical Connection Details

6. Power and Control Connections

6.1 Wiring-up the Unit

Electrical terminations should be made onto the screw terminal side of the outdoor unit terminal blocks as detailed in Table 6.1 on page 9

6.2 Wiring Requirements

Power supply – Connection of isolation power supply to the outdoor unit.

Interconnecting Wiring – Power and signal cables run between outdoor and indoor unit.

Details of the fuse ratings and cable requirements are given in tables 7.3, 7.4, 7.5, & 7.6 on page 8 of this manual.

Note: On units with 3 phase power supplies, ensure the 3 phases are connected in the correct notation i.e. L1, L2, L3. If the phase notation is incorrect the compressor will fail to pump and will likely be noisy. If this is the case then two phases will need to be swapped over to achieve correct notation.

6.3 Terminations

Details of cable terminations and interconnections are given in Table 6.1.

Note:- A wiring diagram is located with the outdoor units, on the inside of the access panel.

6.4 Wiring Diagrams

These are fitted.

SPECIAL NOTES :

REFER TO KIT INSTRUCTIONS FOR ELECTRICAL CONNECTION OF SITE OPTION KITS !

DO NOT MEGA OR FLASH TEST WITH ELECTRONIC PCB'S IN CIRCUIT

INDOOR AND OUTDOOR UNITS SHOULD HAVE LOCAL ELECTRICAL ISOLATORS

7 . Refrigerant Pipe Connections

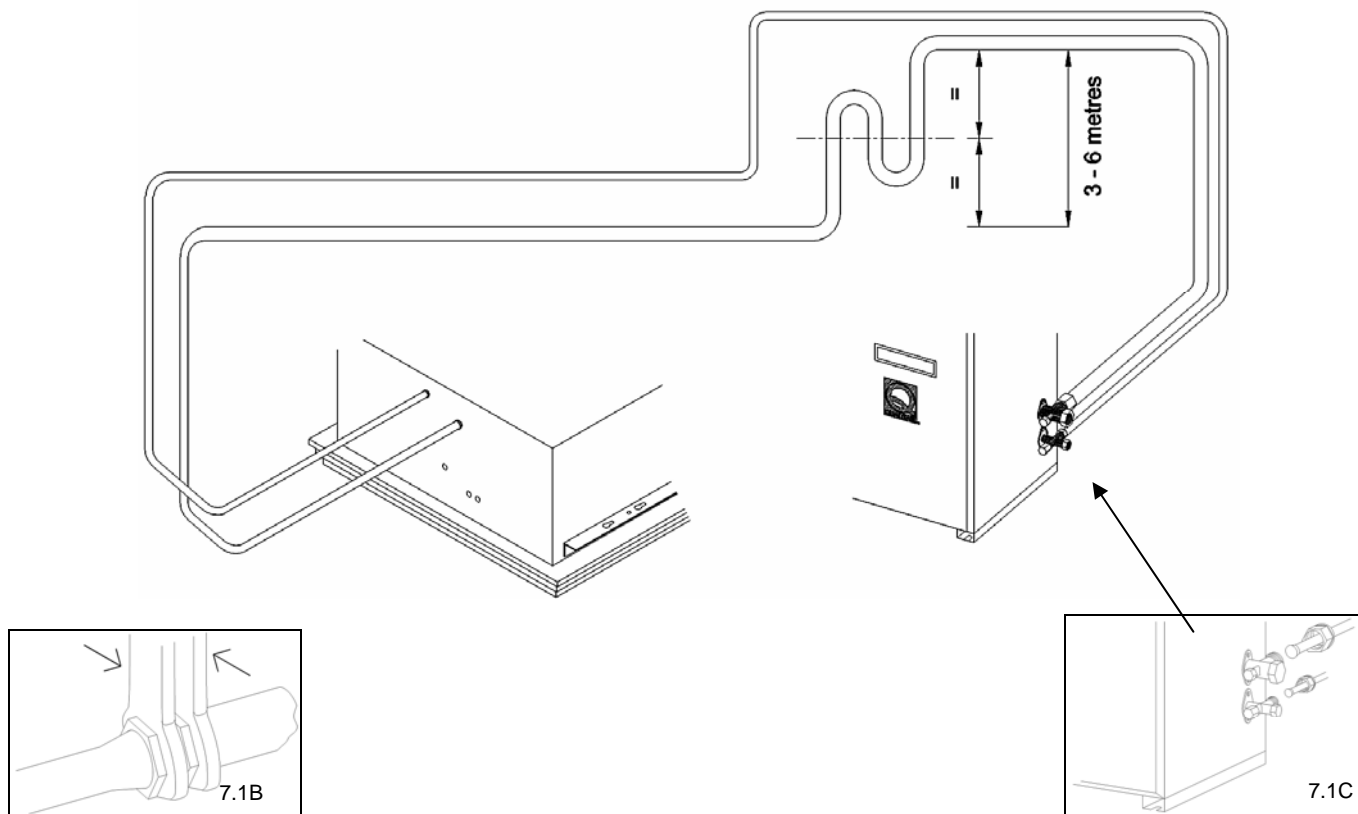


Figure 7.1 – Refrigerant Pipe Connections

7.1 Expansion Device

- ICUCooling Only Units are supplied WITHOUT any expansion device as this is supplied with the indoor unit
- ICU H/Pump Units can be supplied with a separate expansion device kit that should be installed in the liquid line

7.2 Pipe Installation

Run the suction and liquid lines in appropriately sized refrigeration copper tubing as detailed in table 7.1 on page 8 of this installation manual. When calculating the effective run take into account any bends or oil traps.

Note: 90 deg elbow equivalent length = 25 x pipe O.D.

Oil trap equivalent length = 50 x pipe O.D

Where the vertical separation exceeds 3 metres, oil traps must be fitted at half the vertical distance as shown on Figure 7.1 above. Ensure the refrigerant lines are adequately supported using refrigerant pipe clips.

7.3 Unit Connections

The outdoor unit connections are terminated in male flare connections as detailed in tables 7.2 on page 8 of this manual. Place flare nuts onto the copper tube before preparing the tube with a flaring tool (7.1C). When connecting to the male flares ensure both surfaces are clean and coat the flared surface with refrigerant oil to help ensure a leak free joint. When tightening the joint use two spanners to prevent twisting of the connections as detailed in figure 7.1B above. Please note that the indoor unit is factory charged with 50psi of dry air or nitrogen which can be safely released to atmosphere.

7.4 Insulation

Suction lines must be insulated to a minimum thickness of 3/8". Hot areas should be avoided when routing liquid lines and consideration should be given to separate insulation of liquid lines to prevent heat absorption.

7.5 Extended Pipe Runs

Special Notes :SLEEVE, SEAL AND WATERPROOF ANY BUILDER WORKS HOLES !
IT IS RECOMMENDED THAT A FILTER/DRIER IS FITTED IN THE REFRIGERATION CIRCUIT.

8.0 Refrigeration Commissioning

Figure 8.1 – Refrigerant Schematic Diagrams

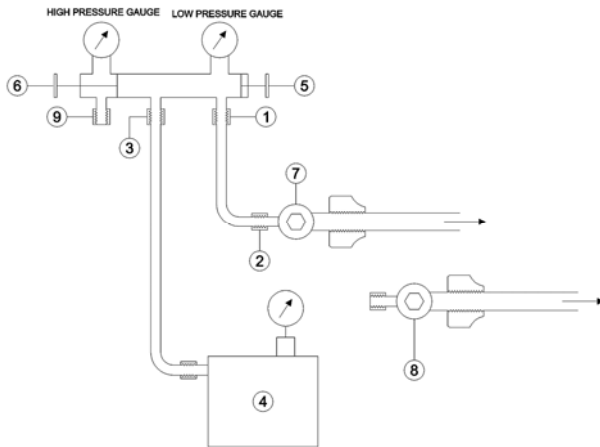


Figure - 8.2 Evacuation and Charging Connections

8.1 Evacuation, Charging and Refrigerant Procedures

After completing the refrigerant connections the following steps should be followed with reference to Figure 8.2 above.

- Service gauges - Connect the low pressure port (1) of a manifold gauge set to the suction line outdoor unit shut off valve service port (2).
- Vacuum Pump - Connect the centre line port (3) of the manifold gauge set to the vacuum pump (4) and operate the pump to ensure a vacuum of 200 microns.

Note: Ensure gauge low pressure port (5) is open and high pressure port (6) is closed.

- System Isolation - After achieving the specified system vacuum close the gauge low pressure port (5) and switch off the vacuum pump. Leave the system for 1 hour and check that the vacuum is maintained. If not, check for leaks, rectify and repeat the pumping down to 200 microns.
- Refrigerant Charging - Open both the outside unit shut off valves (7 & 8) to release the factory refrigerant into the system. Weigh in the site top-up charge using a charging station and any additional extended pipe run charge as detailed in the indoor unit instructions. (Note that on units ICU36,48 AND 60 there is no refrigerant charge in the units and therefore the full charge as indicated in the indoor unit instructions must be made).
- Disconnect the vacuum pump and connect the gauge high pressure port (9) to the discharge line of the outdoor unit shut off valve (10), ensuring that the gauge central port (3) is closed. Run the system, allow pressures to stabilise and ensure correct operation. After final commissioning remove the gauge set, fit all valve caps and carry out a final refrigerant leak test.

SPECIAL NOTES

Temperature Sensing HPC only.

TO RUN FAN SPEED CONTROLLER AT MINIMUM SPEED DISCONNECT ONLY ONE OF THE SENSOR LEADS

TO RUN FAN SPEED CONTROLLER AT MAXIMUM SPEED DISCONNECT BOTH SENSOR LEADS AND LINK OUT THE TWO TERMINALS.

+ Pressure Fan Speed Controller

8.2 Charge Weights

R407 Cooling Units

	ICU9	ICU12	ICU18	ICU24	ICU36	ICU48	ICU60
Base Charge (g)	600	1100	1600	1900	2800		
Top up charge/m > 5m	25	25	40	40	40		

R22 Cooling Units

	ICU9	ICU12	ICU18	ICU24	ICU36
Base Charge (g)	1100	1400	1524	1766	2800
Top up charge/m > 5m	25	25	40	40	40

: R22 Heat Pump Units

	ICU9	ICU12	ICU18	ICU24	ICU36
Base Charge (g)	1150	1500	1620	1800	2900
Top up charge/m > 5m	25	25	40	40	40

? DUTIES

9.0 Ancillary Service Connections

9.1 Heat Pump De-Frost Condensate Removal

Thought should be given to de-frost water from Heat Pump Outdoor units and the potential danger from freezing if allowed to run onto a roof or similar area.

A separate drain tube plate is provided with the unit which fits over a 15mm sleeve and onto the bare drain hole. Use 2-off No12 self tapping screws.

To prevent drain pipe from freezing in prolonged sub-zero temperatures, drain line heater boxes or heater tape should be considered.

10.1 Disposal Procedure

NOTE!

All refrigerants, oils and other waste materials must be disposed of in a professional and responsible manner in strict adherence to environmental regulations.

NOTE!

The greatest possible care should be taken at all times to avoid the release of refrigerants to the atmosphere.

The de-comisioning, dismantling and disposal of air handling units should be undertaken only by experienced personnel and by full adherence to all safety rules, in particular protection of lungs, eyes and skin from refrigerants, dust etc. Only approved lifting gear and power tools should be used and access to the work area be restricted to authorised personnel.

- 1. Disconnect the unit from the electrical supply.**
- 2. Reclaim all refrigerant from the unit, using approved reclaiming equipment according to the manufacturer's instructions. Recovery of refrigerant must be carried out only by operatives registered for refrigerant safe handling.**
- 3. Dispose of the reclaimed refrigerant through an approved recycling facility.**
- 4. Separate the unit sections and remove to approved recycling facilities.**

SPECIAL NOTES :

ENSURE ALL CONNECTIONS EXTERNAL TO THE UNIT CASING AND DRAIN PIPEWORK IS ADEQUATELY INSULATED TO PREVENT FREEZING OR CONDENSATION

- 1) Have all options kits been fitted ?
- 2) Have units been mounted level and correct drainage been checked?
- 3) Have the suction line, expanded liquid line (if required) and condensate drains (if required) been adequately insulated ?
- 4) Has the correct HRC external fusing/isolating been installed ?
- 5) Has the additional site top-up (cooling only unit) and extended pipe-run refrigerant charge been measured into the system ?
- 6) Has the operating manual been handed to the customer?
- 7) Has the warranty booklet been read and filled in?
Note:- If a service contract is not taken out only a 1 year warranty is applicable.

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